**REMARKS**

The Examiner is thanked for the due consideration given the application.

Claims 19-29 and 36-40 are pending in the application. Claims 19-29 have been amended to clarify the language and to better set forth the claimed invention. New claims 36-39 generally set forth subject matter canceled from the previous claims. New claim 40 finds support at page 2, line 15 of the specification.

No new matter is believed to be added to the application by this amendment.

**Information Disclosure Statement**

The references discussed in the specification have been formally submitted for consideration in a concurrently filed Information Disclosure Statement.

**Claim Objections**

Claim 19 has been objected to as containing a misspelled word. Amended claim 19 is free from misspellings.

**Rejection Under 35 USC §112, Second Paragraph**

Claims 25-29 have been rejected under 35 USC §112, second paragraph as being indefinite. This rejection is respectfully traversed.

The Office Action asserts that the claims utilize the word “it”, which renders the claims indefinite. However, the claims have been amended to not utilize the word “it”.

The claims are thus clear, definite and have full antecedent basis.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

**Rejections Based on MERCURI et al.**

Claims 19-21 and 23-25 have been rejected under 35 USC §102(b) as being anticipated by MERCURI et al. (U.S. Publication 2002/0182387).

Claim 22 has been rejected under 35 USC §103(a) a being unpatentable over MERCURI et al.

Claims 19-29 have been rejected under 35 USC §103(a) as being unpatentable over KODAMA et al. (U.S. Patent 4,279,952) in view of MERCURI et al.

These rejections are respectfully traversed.

The present invention pertains to refractory carbonaceous materials that can be used as high temperature thermal insulation in furnaces operating at high temperatures in non-oxidizing atmospheres. As is exemplarily set forth in claim 1, the present invention includes:

> *at least one flexible dense compressed expanded graphite layer based on compressed expanded graphite particles, and a density of the flexible dense compressed expanded graphite layer is between 0.5 and 1.6 g/cm$^3$ (500 and 1600 kg/m$^3$); and*
>
> *at least one sub-dense compressed expanded graphite layer, based on compressed graphite particles with a lower density, which is between 0.05 and 0.3*

*g/cm$^3$ (50 and 300 kg/m$^3$), said dense and sub-dense layers being adjacent and bonded to each other.*

Claim 19 of the present invention thus sets forth a thermal insulation structure formed from:

a) a so-called dense compressed expanded graphite layer (DCEGL), with a density between 0.5 and 1.6. g/cm$^3$, and

b) a so-called sub-dense compressed expanded graphite layer (S-DCEGL), with a lower density between 0.05 and 0.3 g/gm$^3$, the DCEGL and the S-DCEGL being adjacent and bonded to each other.

Now consider MERCURI et al.

MERCURI et al. discloses a composite material able to be embossed for electrochemical fuel cells. For example in Figure 1 of the reference (discussed in paragraph 0077), which is reproduced below.

Figure 1

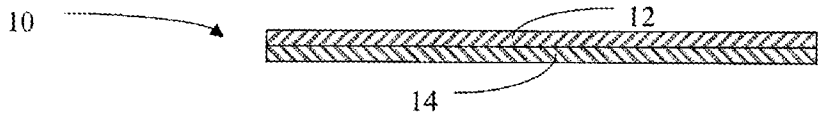



Figure 1 of MERCURI et al. shows a composite material formed from two resin impregnated flexible graphite sheets (RIFGS) 12 and 14, with the top layer 12 having a density between 0.1 and 1.4 g/cm3, and a bottom layer 14 having a density of from 1.4 to 1.8 g/cm3. Both of these layers 12 & 14 are ***resin***

***impregnated***, as is clearly discussed in paragraph 0077 and throughout the disclosure of MERCURI et al. See, for example, paragraph 0082 of Example 1, which states: "Two sheets of resin impregnated graphite foil are provided."

In Example 1 of MERCURI et al. the composite is made by providing two sheets of resin impregnated graphite foil:

- one having a density of 0.75 g/cm$^3$ with a thickness of 1.0 mm,

- the other having a density of 1.0 g/cm$^3$ with a thickness of 1.0 mm.

These two sheets are layered and then compressed between rolls spaced at 1.5 mm, so as to consolidate the two sheets into a single composite.

It may be supposed that in the final composite, with a ratio of compression of 1.333 (= 2/1.5) the densities should increase from 0.75 to ***1 g/cm$^3$*** for one layer, and from 1 to ***1.33 g/cm$^3$*** for the other.

Therefore, on one hand, MERCURI et al. deal with densities of ***resin impregnated*** graphite foils, whereas compressed expanded graphite layer of the present invention ***are not resin impregnated***. As a consequence, it is highly questionable to compare data relating to objects different in nature.

On the other hand, nothing in MERCURI et al. discloses the combination densities in Claim 19:

* a density between ***0.5 and 1.6 g/cm$^3$*** for the layer "DCEGL", and

* a density between ***0.05 and 0.3 g/cm$^3$*** for "S-DCEGL".

In contrast, Example 1 of MERCURI et al. sets forth densities of the two layers of 1 and 1.33 g/cm$^3$!

Recall that in Example 1 of MERCURI et al., densities of the two layers are: 1 and 1 .33 g/cm

Claim 19 is thus not anticipated by MERCURI et al. Claims depending upon claim 19 are not anticipated by MERCURI et al for at least the above reasons.

Now consider the assertion of unpatentability over MERCURI et al.

MERCURI et al. neither disclose not infer to one of skill ***thermal insulating elements*** as are set forth in independent claim 19 of the present invention.

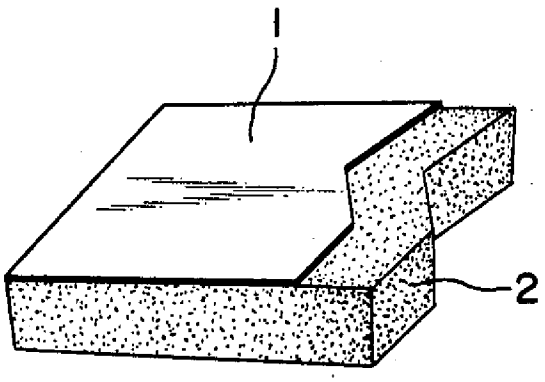
Regarding claim 22, in MERCURI et al. there is no teaching or suggestion to provide a structure or an element with a number N of layers, with an alternation of layers D / S-D / D / S-D / D etc. The skilled person could find any clue in MERCURI et al for such an alternation of layers.

One of ordinary skill and creativity would thus not produce a claimed embodiment of the present invention from a knowledge of MERCURI et al. sufficient to assert *prima facie* unpatentability.

Now consider KODAMA et al. in view of MERCURI et al.

KODAMA et al.'s disclosure deals with multilayer insulating material and a process of production thereof. Figure 4 of KODAMA et al. is reproduced below.

FIG.6




KODAMA et al. discloses generic features of an insulating material basically formed from a layer of graphite sheet (GS) 1 and a layer of carbon felt (CF) 2, layers 1 and 2 being bonded by means of a binding agent (BA) which does not exist as a specific layer. See column 4, lines 16 to 26. This may be symbolically described as (GS) / (BA) / (CF).

The carbon felt CF and possibly the graphite sheet GS ***have to be impregnated by a carbonizable resin liquor.***

As to the impregnation of the graphite sheet GS 1, see column 4, line 60 et seq.: "the graphite sheet... has some room. .. for the impregnation thereinto of carbonizable resin.," or at column 6, line 23 et seq.: : "with the small quantity of the carbonizable resin impregnating the graphite sheet...." or at column 6, lines 23 *et seq.*: "a dilute solution of the resin to be

carbonized is caused to impregnate also a graphite sheet possessing tightness. . .”

Nevertheless, in the Example, there is no impregnation of the flexible graphite sheet, but simply a coating. See column 8, lines 39-42.

As to the impregnation of carbon felt 2, see at column 5, lines 40 et seq.: “In the impregnation of the carbon fiber felt sheet and/or the graphite sheet(s). . .” or at column 8, lines 32-38: “This felt sheet was impregnated with an impregnating liquor prepared by dissolving a resol type phenolic resin in equal weight of ethanol, the impregnation quantity being 300 grams of resin per kilogram of the felt. . .”

In KODAMA et al., the graphite sheet 1:

* has a density of 0.6 to 1.6 g/cm$^3$, see column 4, line 15, and

* has a thickness of less than 1 mm, preferably from 0.5 mm to 0.2 mm, See column 5, lines 3-4. A thickness of 0.5 mm is cited in the Example at column 8, line 40.

In KODAMA et al., the carbon felt sheet 2:

* has a density of 0.06 to 0.10 g/cm3, see column 4, lines 30-32, a bulk of 0.09 g/cm$^3$, see column 5, line 68 and the Example at column 8, line 30, and

* has a thickness of the order of 5 to 25 mm, See column 4, line 37.

It is true that KODAMA et al. and the present invention both deal with the field of insulating materials. However, fundamental differences include:

- the carbon felt of KODAMA et al. is replaced by a sub compressed expanded graphite layer S-DCEGL,

- in the present invention, there is no impregnation of any layer before assembling them. The layers to be assembled being are simply coated before compression. See at page 14-Line 27 of the description: “each interface being previously coated with phenolic resin. ..The assembly is then heated up...”

Consider the combination of KDAMA et al. and MERCURI et al.

First, these two disclosures deal with different technical fields, the field of MERCURI et al. being far away from the field of the present invention or the one of KODAMA et al. The skilled person would thus have not considered MERCURI et al.’s disclosure.

Secondly, the skilled person would have considered the problems to be solved. The problems to be solved in MERCURI et al. have nothing to do with the ones treated in the present invention or in KODAMA et al.

Thirdly, at the time of KODAMA et al.’s invention, graphite sheets of any density were already known. And KODAMA et al. ***has not recognized the advantageous graphite sub-dense layer.*** Such a layer cannot be logically suggested to the skilled person

on the basis of a document dealing with a completely different field.

Moreover, it must be recalled that MERCURI et al. disclose a top layer 12 having a density between 0.1 and 1.4 g/cm$^3$ and a bottom layer 14 having a density from 1.4 and 1.8 g/cm$^3$. Both of these layers 2 & 14 are ***resin impregnated***. In Example I of MERCURI et al., the composite is made by providing two sheets of resin in graphite foil:

- one having a density of 0.75 g/cm$^3$ with a thickness of 1.0 mm

- the other having a density of 1.0 g/cm$^3$ with a thickness of 1.0 mm.

***Even if the felt layer of KODAMA et al. had been artificially replaced by a graphite foil layer of MERCURI et al. having a density of 0.75 g/cm$^3$ with a thickness of 1.0 mm, the final product would have been out of the scope of the present invention, and out of the scope of claim 19.***

There is no teaching or inference that would lead the person skilled in the art for a sub-dense graphite layer S-DCEGL having a density of 0.05 to 0.4 g/cm$^3$. There is teaching or inference to combined dense and sub-dense layers without impregnation. This is not suggested by the cited prior art.

The structures and elements having the combined technical features of the present invention simultaneously have at least four advantages:

- emission of particles is low,

- high mechanical strength,

- very low thermal conductivity, and

- very low chemical reactivity.

These combined advantages of the present invention would have been obtained by using impregnated layers, and the present invention thus achieves results that are unexpected over the conventional art typified by KODAMA et al. and MERCURI et al.

MERCURI et al. thus does not anticipate a claimed embodiment of the present invention. One of ordinary skill and creativity would thus not produce a claimed embodiment of the present invention from a knowledge of MERCURI et al. or of KODAMA et al. and MERCURI et al. A *prima facie* case of unpatentability has thus not been made.

These rejections are believed to be overcome, and withdrawal thereof is respectfully requested.

**Conclusion**

The Examiner is thanked for considering the Information Disclosure Statement filed July 7, 2005 and for making the references therein of record in the application.

The objections and rejection are believed to have been overcome, obviated or rendered moot. As not issues remain, the issuance of a Notice of Allowability is respectfully solicited.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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